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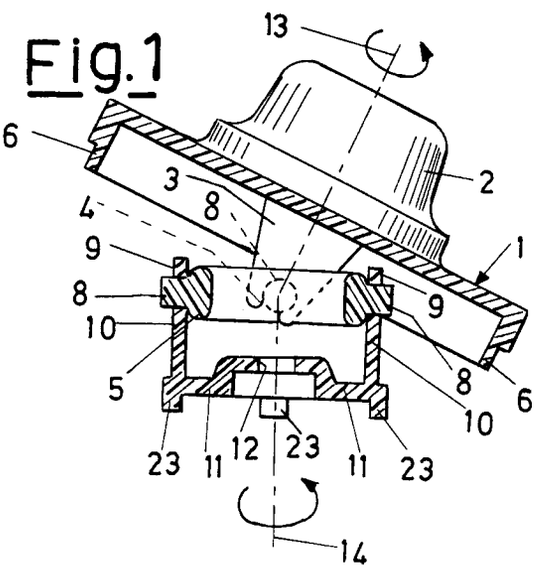
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(54) Mechanical joint between a knob and its controlled device.

(57) Knob for actuating a rotary control device (18;30) for washing machines or dishwashers, comprising a grip (2) and an element (11) for coupling to a drive shaft (19;31) of the control device (18;30), and moreover comprising an articulated joint (3-5,8-10) positioned between said grip and said coupling element (11).

Fig.1



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The present invention relates to a knob for actuating rotary control devices with an articulated joint coupling, in particular for actuating selector switches, thermostats and programming devices in washing machines or dishwashers.

There is a known tendency to produce washing machines and dishwashers with increasingly compact structures wherein the space between the external unit and the washing drum assembly is increasingly small.

This restricts to a greater extent the space available for housing control devices, typically selector switches, thermostats and programming devices/timers, subject to the safety limits imposed by current legislation.

At present selector switches, thermostats and programming devices are controlled by knobs keyed axially onto the drive shaft of the same. In this way the absence of relative bending between the knob and shaft of the selector switch is guaranteed, so as to achieve a constantly correct setting of the selector switch itself, using notches or reference indicators of an external reader. The overall dimensions of the knob/control device assembly are however rigidly fixed in this case, thus limiting the flexibility of use thereof.

Systems of connection between knob and selector switch, thermostat or programming device using flexible leads or intermediate wheels, are also known.

These systems however make the setting of the selector switch inaccurate due to clearance or elastic twisting and/or bending, above all when the reference indicators of the external reader are very close together.

The fact should also be taken into consideration that standard manufacture programming devices/timers are fitted, for their forward movement during the operating cycle of the machine in question, with a motor capable of expressing a specific driving torque, and that therefore it is not possible to insert additional rotary mechanisms between the shaft of the programming device and the knob which overload the motor of the programming device itself.

In view of the state of the art described, the object of the present invention is to provide a knob for actuation of a rotary control device of a washing machine or dishwasher, typically a rotary selector switch or thermostat or programming device, which allows a reduction in the overall dimensions of the knob/control device assembly, nevertheless avoiding the problems mentioned above.

In accordance with the present invention, this object is achieved thanks to a knob for actuating a rotary control device for washing machines or dishwashers, comprising a grip and an element for coupling to a shaft for driving the control device, characterised in that it comprises an articulated joint placed between said grip and said coupling element.

A knob according to the present invention allows greater flexibility in positioning the rotary control device in relation to the actuation knob, in that it enables actuation of the control device even if the axis of the drive shaft of the latter is not aligned with the axis of rotation of the knob. This positioning flexibility may be important from the point of view of safety, that of practicality and ergonomics and appearance.

The features of the present invention will become clearer from the following detailed description of one of its embodiments, illustrated by way of a non-limiting example in the accompanying drawings, in which:

Figure 1 shows, in axial section, a knob according to the present invention;

Figure 2 shows, sectioned along a vertical plane, a control panel of a top-loader washing machine;

Figure 3 shows, sectioned along a horizontal plane, a control panel of a front-loader washing machine.

As shown in Figure 1, a knob according to the invention consists of a disk 1, for example in plastic, wherefrom a grip 2 projects frontally and centrally. This disk 1 is also referred to as the "display disk", in that it generally has engraved, in circumferential order, symbols for identifying, together with a fixed external reference indicator on a panel of washing machines or dishwashers, the various working positions of the rotary control device, that is to say of the selector switch or thermostat or programming device/timer.

At the rear the disk 1 is provided with a first pair of forks 3, projecting therefrom in a diametrically opposite position one to the other. Each fork 3 is provided at its own end with a respective slot 4 suitable for housing a respective pin internally and freely rotatably.

A plastic ring 5 holds two pairs of pins 8 projecting radially and placed in circumferential order along the external surface of the ring 5, equidistant one from the other at right angles. The pins 8 of each pair are therefore diametrically opposite one to the other.

The pins 8 of a first pair engage in the respective slots 4 of the two forks 3, while the pins 8 of the other pair engage in two respective slots 9 each formed in a fork 10 of a second pair of forks projecting from a disk 11 with a diameter smaller than that of the disk 1 and provided in its centre with a through hole 12 for the passage of a small drive shaft of a rotary control device. The disk 11 therefore forms an element for coupling to the drive shaft of the control device, a coupling which may be direct, should the disk 11 be keyed directly onto

the drive shaft, or indirectly, when the disk 11 is made integral with some other element, such as distribution cams, which is in turn integral with the drive shaft.

The first pair of forks 3, the ring 5 with the two pairs of pins 8 and the second pair of forks 10 form an articulated universal joint coupling between the disk 1 and the disk 11 which, as is known, allows transmission of rotary motion of the disk 1 to the disk 9, and vice versa, even if the rotation axes 13 and 14 of the two disks 1 and 11 form an angle other than zero one in relation to the other. This angle is not moreover fixed, but instead may vary.

Figure 2 refers to a washing machine of the so-called "top-loader" type, that is to say where access to the loading drum is gained from the top, instead of the front, of the washing machine. In such machines, the control devices are also located above, and are housed in a control panel or console 15 which for ergonomic reasons is tilted towards the front of the washing machine.

With reference to Figure 2, a frame 16, fitting the washing machine externally, is generally covered above by a covering 17 (trim) in a plastic material, whereto a rotary control device 18 is also attached, typically a programming device/timer, which regulates the functioning of the machine, causing the performance of the predetermined sequence of the various phases of a washing cycle. The programming device 18 is provided with a small drive shaft 19 which projects above, through a hole 20 in the covering 17. A plastic disk or distribution cam 21 is keyed onto the shaft 19, and which, rotating together with the shaft 19, causes the actuation of a rod (not shown as in itself known) which drives a water distributor. The disk 21 also has engagement holes 22 placed in circumferential order and wherein the same number of teeth 23 are inserted, projecting below the smaller disk 11 of the knob, to make the latter integral with the drive shaft 19 (Figs. 1 and 2).

The panel 15 is provided with a hole 24 for housing the display disk 1 of the knob of Figure 1. In order to contrast the force which is exerted on the knob during its manual control, a force which is substantially aimed along the axis of the knob itself, the panel 15 is provided, in an upper section of the internal edge of the hole 24, with a bucking prong 25, which is inserted in a circumferential groove 6 formed on the edge of the disk 1. A disk 26, in transparent material, covers the hole 24 above, only allowing the grip 2 of the knob to project. In this way the user can determine, on the basis of the coincidence of an external indicator with one of the notches whereof the display disk 1 is provided, the current phase of the machine.

Figure 3 however shows, sectioned along a horizontal plane, part of a traditional front-loader washing machine. These machines are generally provided, in the upper part of their external front surface, with a plastic panel 27 which covers a metal bracket 28 whereto the control devices are attached, and which is in turn attached to a frame 29 fitted over the machine.

As can be seen in Figure 3, in order to reduce the overall front dimensions of a selector switch, thermostat or programming device 30, the latter is mounted in a tilted position in relation to the front wall of the washing machine, providing a recess 7 in the bracket 28.

The panel 27 is provided with a circular outlet 32 wherein the disk 1 of the knob is housed, and a hole 33 for the passage of the two forks 3. The disk 1 is also covered above by a disk 34 in a transparent material.

Unlike the case in Figure 2, the smaller diameter disk 11 of the knob is shaped so as to be fitted directly onto the shaft of the selector switch 31. By arranging the programming device 30 in this way, space is made available for other control devices, such as thermostats, different selector switches and pushbuttons.

The knob according to the present invention can obviously be used also for actuating adjustable thermostats and, in general, for rotary control devices in other electrical household appliances.

For proper working of the knob according to the invention, the angle between the axis of rotation of the display disk 1 holding the grip and the small disk should preferably be no greater than 25°.

Claims

1. Knob for actuating a rotary control device (18;30) for washing machines and dishwashers, comprising a grip (2) and an element (11) for coupling to a drive shaft (19;31) of the control device (18;30), characterised in that it comprises an articulated joint (3-5,8-10) placed between said grip and said coupling element (11).

2. Knob according to claim 1, characterised in that said articulated joint (3-5,8-10) is a universal joint and comprises a first pair of forks (3) integral with said grip (2), each of which is coupled, freely rotatably, to a respective pin (8) of a first pair of diametrically opposite pins projecting from an intermediate element (5) of the joint, and a second pair of forks (10) integral with the element (11) for coupling to the drive shaft (19;31) of the control device (18;30), each of which is coupled, freely rotatably, to a respective pin (8) of a second pair of pins, diametrically opposite and projecting from the intermediate element (5), ar-

ranged in a direction orthogonal to that of the first pair of pins (8).

3. Knob according to claim 2, characterised in that said grip (2) is connected to one face of a disk (1) to whose opposite face the first pair of forks (3) is attached.

4. Knob according to claim 2, characterised in that said intermediate element of the joint comprises a ring (5) provided with four radially projecting pins, placed in circumferential order and equidistant one in relation to the other, which form the two pairs of pins (8).

5. Knob according to claim 1, characterised in that said control device (18;30) is a rotary selector switch.

6. Knob according to claim 1, characterised in that said control device (18;30) is a rotary thermostat.

7. Knob according to claim 1, characterised in that said control device (18;30) is a programming device/timer.

Fig.1

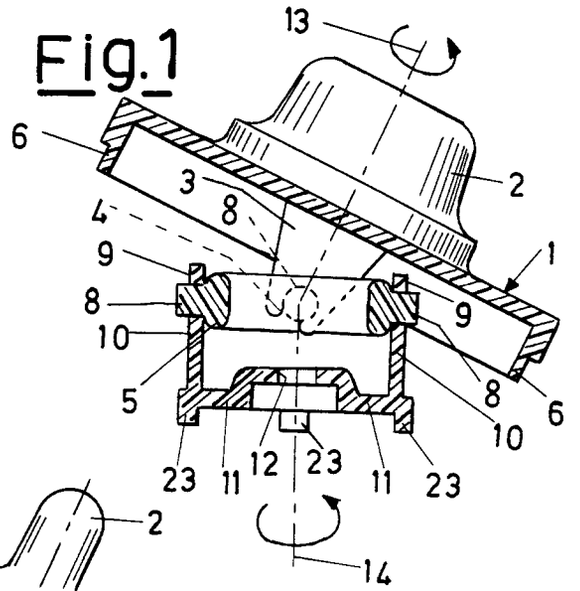


Fig.2

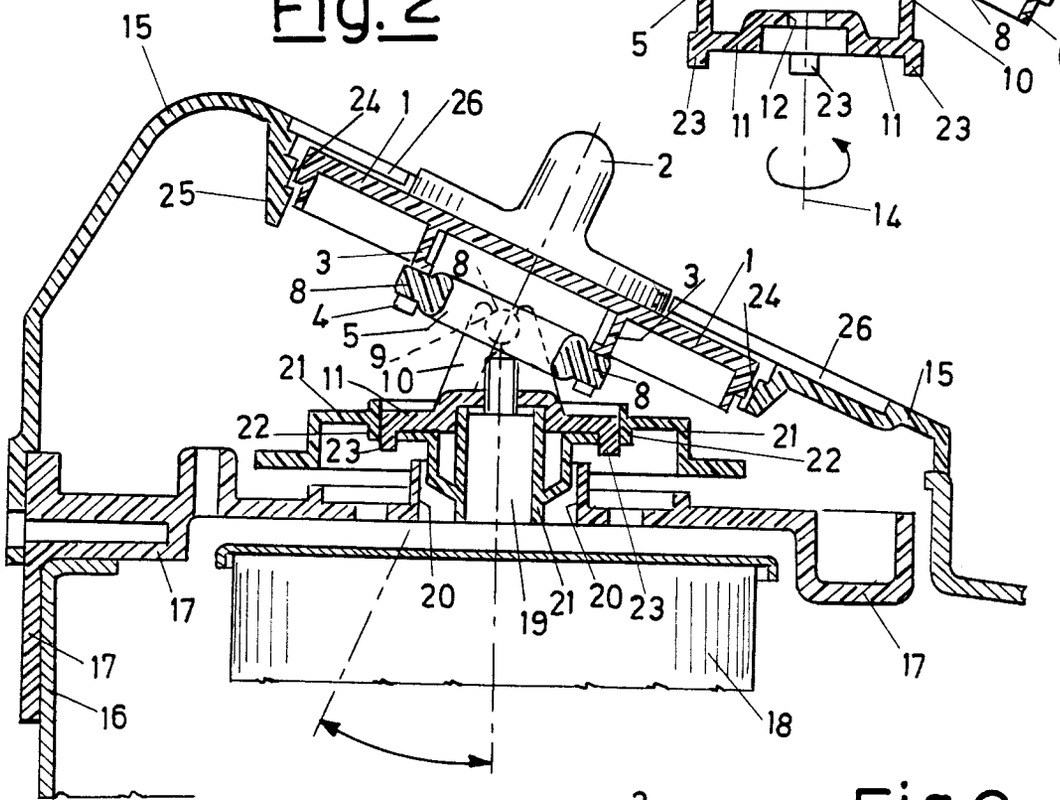
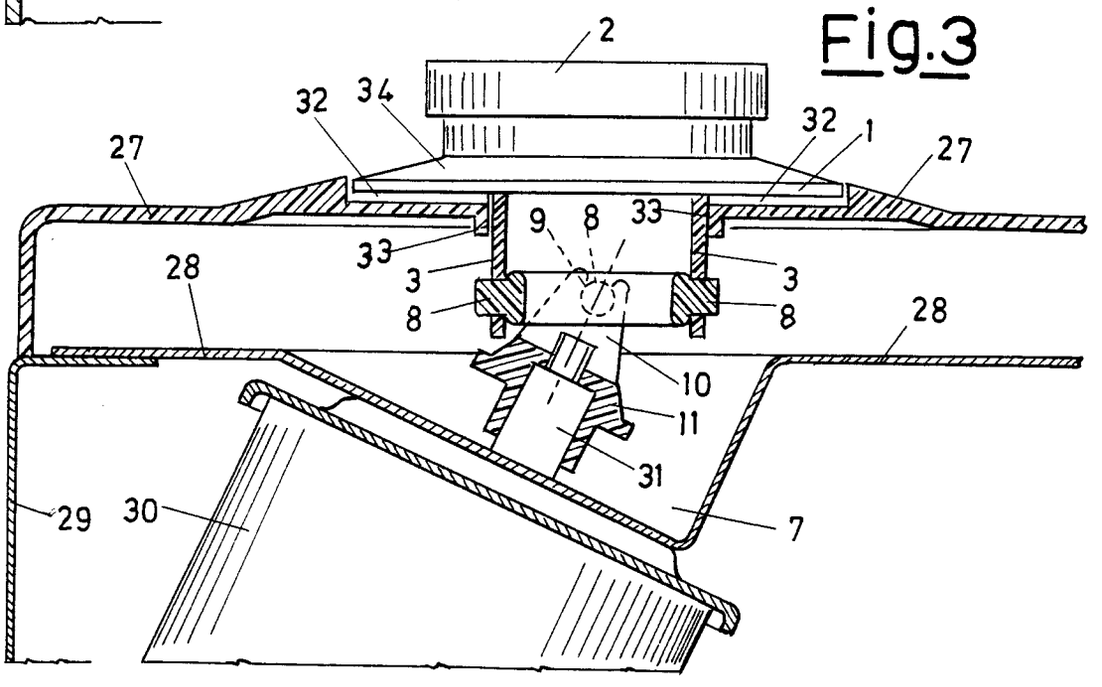


Fig.3



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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 0392

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 397 899 (SIEMENS AG) 22 November 1990 * the whole document *	1-3,5	G05G7/02
X	US-A-5 128 503 (FRANTZ MARK G) 7 July 1992 * the whole document *	1-3,5	
X	DE-A-35 28 063 (BOSCH SIEMENS HAUSGERAETE) 5 February 1987 * figures *	1	
X	US-A-4 011 513 (KAWACHI MANABU) 8 March 1977 * figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G05G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 June 1995	De Schepper, H

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